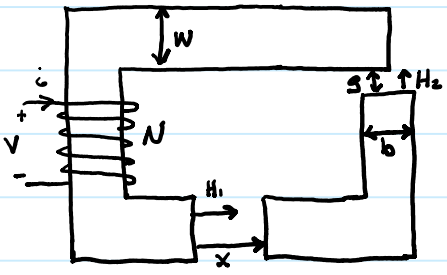
Ex



depth w into page

Find: a) H_1 and H_2

b) λ

Solution: a) $H_1 x + H_2 g = Ni$

$H_1 x + H_1\left(\frac{gw}{b-x}\right) = Ni$

$H_1\left(x + \frac{gw}{b-x}\right) = Ni$

$H_1\left(\frac{x(b-x)+gw}{b-x}\right) = Ni$

$\mu_0 H_2 w(b-x) - \mu_0 H_1 w x = 0$

$H_2(b-x) = H_1 x$

$H_2 = H_1\left(\frac{x}{b-x}\right)$

$$H_1 = \left[\frac{(b-x)N}{x(b-x)+gw}\right] i \qquad H_2 = \left[\frac{Nx}{x(b-x)+gw}\right] i$$

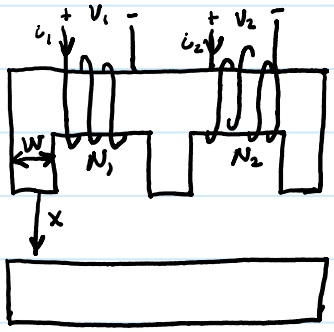
b) $\phi = \mu_0 H_1 w^2$

$$\phi = \left[\frac{\mu_0 w^2 (b-x)N}{x(b-x)+gw}\right] i$$

$\lambda = N\phi \Rightarrow$

$$\lambda = \left[\frac{\mu_0 w^2 (b-x)N^2}{x(b-x)+gw}\right] i$$

Ex

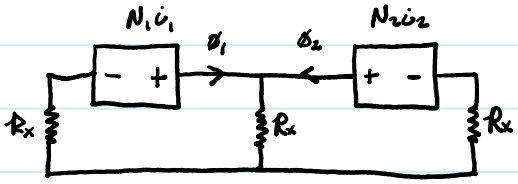


depth w

Find: a) λ_1 and λ_2

b) L_1, L_2, M

Solution: a)



$R_x = \frac{x}{\mu_0 w^2}$

$N_1 i_1 = R_x(\phi_1 + \phi_2) + R_x \phi_1$

$N_1 i_1 = 2R_x \phi_1 + R_x \phi_2$

$-2N_2 i_2 = -2R_x \phi_1 - 4R_x \phi_2$

$N_1 i_1 - 2N_2 i_2 = -3R_x \phi_2$

$\phi_2 = \frac{1}{3R_x}(-N_1 i_1 + 2N_2 i_2)$

$\phi_1 = \frac{1}{3R_x}(2N_1 i_1 - N_2 i_2)$

$N_2 i_2 = R_x(\phi_1 + \phi_2) + R_x \phi_2$

$N_2 i_2 = 2R_x \phi_2 + R_x \phi_1$

$2R_x \phi_1 + \frac{1}{3}(-N_1 i_1 + 2N_2 i_2) = N_1 i_1$

$2R_x \phi_1 = \frac{4}{3} N_1 i_1 - \frac{2}{3} N_2 i_2$

$\lambda_1 = N_1 \phi_1 \qquad \lambda_2 = N_2 \phi_2$

$$\lambda_1 = \frac{\mu_0 w^2}{3x}(2N_1^2 i_1 - N_1 N_2 i_2)$$

$$\lambda_2 = \frac{\mu_0 w^2}{3x}(-N_1 N_2 i_1 + 2N_2^2 i_2)$$

b) $L_1 = \frac{\mu_0 w^2 2N_1^2}{3x} \qquad L_2 = \frac{\mu_0 w^2 2N_2^2}{3x} \qquad M = \frac{\mu_0 w^2 N_1 N_2}{3x}$